Water demand management scheme

Drakenstein, South Africa

water scarcity impact

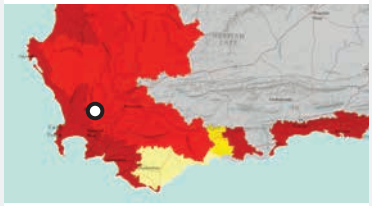
Reduced withdrawal	●
Reduced consumption	●
Improved water quality	
Increased productivity	●
Net basin benefit	●

volumetric impact
5 900 000 m^3/yr

capital cost
$2 000 000

estimated unit cost of water
<5 ¢/m^3

Water Stress
Drakenstein, South Africa



Arid & low water use
Low (<10%)
Low to med (10-20%)
Med to high (20-40%)
High (40-80%)
Extremely high (>80%)
No data available

Water Stress Map:
Gassert, F., M. Landis, M. Luck, P. Reig, and T. Shiao. 2013. "Aqueduct Global Maps 2.0."

Confidence level
Low Medium High

Water Scarcity Impact Key
Main Minor

Credits
We wish to acknowledge the input of Mr Andre Kowaleski of the Drakenstein Municipality in the preparation of this case study.

Project Overview

The Drakenstein Municipality has a total population of 224 240. In 1999 faced with an annual growth in water demand of 3.5% and non revenue water standing at 33%, it decided to take action. This took the form of a comprehensive water demand management programme which had six goals; i) reducing the high percentage of non-revenue water, ii) reducing the high static water pressures iii) reducing the high average daily demand, iv) increasing the total revenue collected by the Municipality, v) providing a more constant and efficient service to consumers and vi) conserving water which was becoming increasingly scarce. Approximately 10% of its water was derived from its own sources with the remaining 90% purchased from the City of Cape Town. The high level of non revenue water provided a major opportunity to decrease the municipality's water bill and at the same time reduce wastage. Interventions were wide-ranging although the introduction of advanced pressure management throughout the system provided the backbone to the overall water demand management programme. Over a period of approximately 12 years, Drakenstein Municipality lowered the non revenue water from over 33% to just under 11% and currently ranks amongst the best municipalities in South Africa with regards to water use efficiency.

Key Elements

- Hydraulic modelling of master plan for the reticulation network to optimise design and performance.
- Metering of all abstraction points.
- Introduction of a tiered block tariff structure supplying essential water at a low cost while at the same time penalising heavy users.
- Increased public awareness including promotion of water saving devices.
- Refurbishment of network infrastructure, leak detection and repair.
- Construction and implementation of pressure management system.

Key Outcomes

- Water demand was reduced from 17 800 000m^3/year in 2000 down to 11 900 000m^3/yr in 2011 representing major savings on water purchases from the bulk water supplier.
- Non revenue water was reduced from 35% to 11% in twelve years resulting in increased revenue for the municipality.
- The performance indicator for physical leakage (ILI) was reduced to below two by 2012 which is one of the lowest (best) in South Africa.
- Value of water savings over the twelve-year period was approximately $85m based on current bulk water tariff of approximately $0.6/$m^3$.

Drakenstein, South Africa

Intervention Features

- Municipal leakage detection and repair
- Pressure management in municipalities
- Water metering in municipalities
- Water tariff management
- Stakeholder engagement

Project Levers

(1) Hydraulic modelling:

A network hydraulic model was used to identify areas of high pressure and to assist in sectorising the network into discrete pressure management zones. Real time data logging was used to monitor the zones and pick up any unauthorised zone valve operations which in turn compromise the pressure management activities.

(2) Metering and block tariff structure:

By the end of the project all properties had been metered and rising block tariff structure was used to charge consumers for all water used. The tariff structure was designed to provide the initial consumption at a heavily subsidised rate, with high volume users paying significantly more in order to discourage water use and at the same time subsidise low volume users.

(3) Public awareness and water savings devices:

Significant efforts were undertaken to educate the consumers on using water efficiently and at the same time create general awareness on the scarcity of water in the region. Various interventions were implemented inside the consumer properties to reduce wastage and water use including basic plumbing repairs as well as the introduction of certain water saving devices. The project enjoyed a high level of support within the community due in part to the job creation through the use of labour-based construction methods using only local labour in conjunction with extensive stakeholder consultation.

(4) Refurbishment and leakage repair:

One of the key interventions of the water loss reduction programme was the identification of water leaks on the reticulation system and a policy to repair all known leaks within an hour where possible. This rather ambitious target for repairing known and reported leaks has helped to reduce physical leakage in the system to one of the lowest levels in South Africa. In cases where pipes had to be replaced, only high quality pipes were used and in many cases, stainless steel fittings were used which greatly reduce future pipe bursts.

(5) Advanced Pressure Management:

Advanced Pressure Reduction was achieved through the introduction of seven pressure reduction valves ranging from 100mm diameter to 300mm, each fitted with flow modulated electronic controllers. The cost of the pressure management installations (i.e. valves, pipe work, chambers, and controllers) was approximately $0.5m, which was paid back through the savings within five months.

Outcomes and Challenges

The goals of the water demand management scheme were met in full. The unacceptably high level of non-revenue water was reduced from 33% to just 11% over a period of 12 years. Despite selling less water to its consumers, a combination of the new block tariff structure and the fact that the municipality was buying significantly less water from the City of Cape Town, resulted in a significant gain in net revenue which greatly outweighed the costs of the various interventions. The value of water savings over the twelve-year period amounted to approximately $85m. Most significantly, the water demand was reduced from 17 800 000m^3/yr to 11 900 000m^3/yr ensuring that the final goal of water conservation was fulfilled.

Above: Typical GSM Pressure Logger used in the Web Based data acquisition and display systems (© WRP (pty) Ltd)